



Colorado Science and Engineering Fair

2024 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Curcaza: An effective Nanogel antibiotic using Neem and Turmeric, to help tackle antibiotic resistance- a global health threat

Finalist's Name: Vedanth Raju

School and City: Aurora Quest K-8, Aurora

Sponsor's Name: DMRSEF

Category: Micro & Molecular Biology (MCRO)

Division: Junior (6th - 8th grades)

Abstract (250 words or less):

WHO/CDC have listed Antimicrobial-resistance (AMR) and resulting superbug infections as a top global health threat, estimating 4.9 million deaths related to AMR and reaching 10 million deaths annually by 2050, equaling cancer-related deaths. Excessive antibiotics use is the main cause of emergence of Antimicrobial-resistance. Developing new antibiotics is time-consuming and expensive. We may run out of drugs to treat life-threatening infections caused by superbugs like Carbapenem-Resistant-Enterobacter (CRE)/ Multi-Drug-Resistant-Pseudomonas.

Creating novel safe and effective antibiotics using existing resources is critical to tackle this problem. So, I have created a topical antibiotic, CURCAZA using two plant based ingredients :1) Curcumin, from turmeric-root 2) Azadirachtin, from Neem-leaves as capping agents for synthesis of silver nanoparticles by green synthesis method, creating a nanogel using Polyvinylpyrrolidone polymer.

I tested Curcaza at a BSL2 microbiology lab against five different bacteria- staphylococcus Aureus, streptococcus, Pseudomonas Aeruginosa and Klebsiella using Kirby Bauer disc diffusion method. Results were very promising with zone-of-inhibition ranging from 35mm-50mm, indicating Curcaza being highly effective in preventing bacterial growth, suggesting it will be effective in treating infections from hundreds of similar bacteria. It is significantly better and more versatile than currently available topical antibiotics. Methodology and results detailed in the presentation.

Curcaza a novel nanogel will be effective in treating a broad-range of infections affecting millions of patients annually. It will help reduce synthetic antibiotic use and resulting antimicrobial resistance while providing an effective, safe and inexpensive option for millions of patients, especially with limited resources and lack of healthcare access.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature:

Date:

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.